TESTIMONY OF
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COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
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Thank you, Mr. Chairman, and members of the Subcommittee, for this opportunity to testify on the National Oceanic and Atmospheric Administration's (NOAA) atmospheric programs
as they are reflected in the President's FY 2000 Budget Request. I will also highlight some recent exemplary performance examples associated with these programs.

Before I begin, let me state that because of investments championed by this Subcommittee, the Administration and the Department of Commerce, NOAA is a world leader in weather and climate research and forecasts, environmental monitoring and research, fisheries management, resource protection, and sustainable use of the coast. This proposed budget is a good budget for NOAA; this is a good budget for the Department of Commerce; this is a good budget for America!

This budget demonstrates our commitment to meeting our responsibilities for

investing in and maintaining our infrastructure. The challenge of investing strategically in the Nation's future requires continuing investments in NOAA's infrastructure, including investments in our people. The FY 2000 budget request includes essential "down payments" to meet these investment needs. Most notably, the budget request:

- provides funding to maintain our supercomputing capacity for the National Weather Service (NWS) and the Office of Oceanic and Atmospheric Research (OAR) Forecast Systems Lab (FSL), while acquiring a massively parallel, scaleable computer to be located at OAR's Geophysical Fluid Dynamics Lab (GFDL), in Princeton, New Jersey.
  provides recurring lease and/or operations costs at a number of NOAA facilities coming on-line in FY 1999 and FY 2000, including the David Skaggs Research Center in Boulder, Colorado. At the same time funds are requested to complete the planning and design of a new state-of-the-art NMFS research facility near Juneau, Alaska.
  provides adjustments-to-base for pay related and inflationary cost increases to the National Weather Service, as well as for the FY 2000 pay raise for the remaining Line Offices.
  includes funds to begin to replace outdated climate/weather observing equipment in order to maintain continuity of core data and services and provides funds for continuing technology infusion for systems developed under the Weather Service Modernization;
  as part of a Commerce-wide capacity building effort, includes $1.0 million to establish educational training relationships through a joint partnership with a consortium of Historically Black Colleges and Universities (HBCU).

These efforts would not only result in the education of new marine, atmospheric and environmental scientists, but would also assist many coastal communities in the development of new business and environmental engineering alternatives to support sustainable economic development; and,

provides funds to accelerate the implementation of the Commerce Administrative Management System (CAMS), which is critical to meeting NOAA's financial management requirements.

We, at NOAA, know that performance is what counts! Therefore, our FY 2000 budget includes measures that track results to the level of investment.

NOAA's FY 2000 request is for $2.6 billion in total budget authority which includes $2.5 billion in discretionary budget authority. This request collectively represents a 12.9% increase over the total budget authority appropriated for FY 1999.

The request is predicated on the need to ensure the continued delivery of essential science, technology, and services to the Nation. The President's Budget Request also allows NOAA to perform an essential role in a number of Departmental, interagency, and Presidential initiatives, including, the Natural Disaster Reduction Initiative, the Climate in the 21st Century Initiative, and building the capacity of the Nation's Historically Black Colleges and Universities (HBCUs). Let me take a moment to say a few words about some of these

important activities.

Natural Disaster Reduction Initiative (NDRI)

Natural hazards related to severe weather (hurricanes, tornadoes, winter storms, droughts, and floods) or geophysical activity (volcanoes, geomagnetic storms, earthquakes, and tsunamis) threaten lives, property, and the stability of local and regional economies throughout the United States.

In FY 2000, NOAA requests a net increase of $42.1 million for the Natural Disaster Reduction Initiative (NDRI) to implement a second phase of the Department's multi-agency strategy, which includes NOAA, EDA and NIST, to reduce and mitigate against the impacts of extreme natural events. The strategy calls for an end-to-end approach to natural disaster mitigation, from research leading to improving understanding and prediction of extreme events, to advances in developing response and recovery plans, to assessment of vulnerabilities of communities and infrastructure, and providing information, technology, and training to reduce vulnerability before and after natural disasters.

As part of this total, NOAA is requesting $1.5 million for the U.S. Weather Research Program (USWRP) to improve the forecast accuracy and lead-time for hurricane landfall location using state-of-the-art instruments deployed by NOAA's high altitude G-IV Jets and NOAA's P3s during hurricane surveillance missions. These increased funds represent the first year of a five to seven year effort that will provide the research and operational implementation necessary to improve

forecasts of hurricanes at landfall.

FY 2000 marks the completion of the NWS modernization for baseline systems including NEXRAD, ASOS, AWIPS, and associated facilities. The Advanced Weather Interactive Processing System (AWIPS) program has made considerable progress this fiscal year. As of June 11, 1999, all 152 baseline AWIPS systems have been deployed within the $550 million funding cap. The system is undergoing an operational test and evaluation (OT&E) of the software Build 4.2 to validate system performance. The OT&E remains on track for June 1999 completion. AWIPS has already shown improvements in NWS's ability to perform its mission by providing the forecasters with advanced capabilities to deliver enhanced warnings and forecasts to the public in severe weather situations. This was vividly demonstrated during the May 3rd tornado outbreak in Oklahoma and Kansas when the NWS issued early warnings well in advance of actual tornado events.

Recently AWIPS earned a top award from Computerworld magazine and the Smithsonian Institution for using technology in an innovative way to benefit society. AWIPS was named the winner in the Environment, Energy and Agriculture category of the Computerworld Smithsonian Awards Program. AWIPS was the only federal award winner, with most of the other nine categories won by some of the Nation’s premier corporations.

The modernization of the Weather Service represented a significant resource commitment by the Administration. The new technology has given the NWS the tools to provide more accurate and timely weather warnings and forecasts

services. The NWS vision of becoming a “no surprise weather service” is becoming a reality today. For example, the average lead time for flash flood warnings improved from 22 minutes in 1993 to 52 minutes in 1998, and the accuracy of flash flood warnings increased from 71 percent to 85 percent. Also lead time for tornado warnings nearly doubled from 6 minutes in 1993 to 11 minutes in 1998, and tornado warning accuracy has increased from 43 percent to 66 percent. NOAA has provided exemplary services during recent hazardous weather events, including:

> On May 3, violent F-4 and F-5 tornadoes swept across the central plains with Oklahoma and Kansas the hardest hit areas. Although 47 people died, countless lives were saved as a direct result of early warnings and new technology installed during the modernization. Average lead time for all tornado warnings was 18 minutes (compared to the national average of 11 minutes). The Advanced Weather Interactive Processing System (AWIPS) was critical to the success of the warning process. The capabilities of AWIPS for rapidly processing and communicating tornado warnings were critical to alerting people during the widespread storms. Another tool which enabled forecasters to make predictions with longer lead times in this event was the Warning Decision Support System (WDSS). The WDSS is a severe weather information system designed to help meteorologists make predictions based on an integrated suite of data. WDSS offers access to more data from NEXRAD radars than is available in current NWS operational systems. WDSS provides improved computer

software to automatically rank storms according to their software-derived severe weather threats. It enables forecasters to view the intensity of storm signatures without the limitations of current NWS operational systems. Developed by NOAA's National Severe Storms Lab (NSSL) and Forecast Systems Lab (FSL), the WDSS is yet another example of the value to come out of the ongoing work between NOAA research and operations. During the event, the Norman NWS Office issued 116 warnings broadcast on NOAA Weather Radio (NWR). In Wichita, KS, a shift supervisor at a plastics company heard the tornado warning over an on-site NWR. 100 workers went to the basement of the building as the company activated its tornado plan. The plant was destroyed, yet there were no injuries.

During the May 3rd tornado that swept through Oklahoma, changeable menus and tables in WDSS, along with radar displays in AWIPS, allowed us to maintain an overview of the outbreak. WDSS also enhanced forecaster confidence that no severe storms were being overlooked. We tracked tornado signatures with exceptionally high velocity values greater than 210 kts. This increased the NWS' confidence to issue strongly worded warnings for storms that occurred in rural areas after dark.

During January 1999, Arkansas experienced the largest tornado outbreak for a January and one of the worst ever recorded in the state. The Storm Prediction Center (SPC) issued severe weather outlooks 24 hours in advance detailing the threat of a significant tornado outbreak in Arkansas. The Little Rock NWS Office issued 44 tornado warnings over a six hour

period with an average lead time of 20 minutes, providing timely, relevant information to the American public.

Last winter extremely cold weather, even by Alaska standards, gripped that state from January 28 until February 12, 1999. Temperatures plummeted to 74 degrees below zero with wind chills dipping to minus 100 degrees Fahrenheit along the northern coast. Alaska was well prepared due to timely forecasts and warnings by the NWS offices in Fairbanks and Anchorage. Outlooks, three days ahead of the event, allowed the Alaska Division of Emergency Services to check all villages to ensure fuel oil supplies were adequate and resupply where necessary. Many village officials attributed the low incidence of problems to the early NWS predictions of the onset of the cold weather.

In order to ensure that these improvements are sustained, the FY 2000 Budget includes the following program increases:

an adjustment to base of $20.0 million in pay-related and inflationary cost increases, and $12.8 million in programmatic changes to the National Weather Service to ensure the continuation of quality accurate and timely weather warnings and forecasts services to the public.

$25.8 million to pay for a full year of operation and maintenance support for the entire NWS AWIPS network.

$2.7 million to support AWIPS operations and WFO Facilities Construction as the result of mitigation actions per the Secretary's Report Team recommendations on the adequacy of NEXRAD Coverage and

Degradation of Weather Services under National Weather Service Modernization for: Caribou, Maine, and Key West, Florida; and continue current operations at Erie, Pennsylvania, and Williston, North Dakota. An additional $1.0 million for mitigation activities is included in the NWS' Operations and Research request.

$3.7 million for other NWS systems activities such as the product improvement initiative and acquisition close-out activities for ASOS and NEXRAD, and to provide commercial aircraft observations (ACARS) for operational use in numerical weather prediction models.

$3.7 million for Weather Forecast Office Construction and Maintenance activities such as: basic facility service contracts and the implementation of corrective and preventive maintenance actions at selected sites across the country; in addition to continue facility retrofit projects necessary to meet current usage requirements as well as safety and fire code regulations.

The request includes an increase of $30.1 million for NOAA's share of the NPOESS program, for a total request of $80.1 million in FY 2000. In FY 2000, the NPOESS program is currently scheduled to complete Phase I design and development of five key sensors and initiate Phase II production of these sensors. This program will be jointly and equally funded by NOAA and DOD. This increase for the NPOESS program is partially offset by a decrease of $8.9 million in the NOAA K-N' polar orbiting spacecraft program. This decrease reflects decreasing funding requirements for this mature program.

The request also includes an increase of $6.8 million for GOES N-Q spacecraft acquisition (a total program of $189.5 million for FY 2000), including development funds for advanced instruments to be ready for the GOES-Q satellite, and the upgrading and replacement of aging ground systems. The request includes a decrease of $5.3 million for the GOES I-M program. This decrease reflects the normal fluctuation of funding requirements as the program approaches completion.

The FY 2000 Request also provides increases for maintaining the operational support for the on-orbit satellites and expanding the use of satellite data.

$1.7 million will fund Satellite Operational Control Center (SOCC) non-discretionary labor and non-labor cost increases in order to avoid risking to the health and safety of the current operational satellites. This increase will also maintain adequate operational data processing capacity and engineering support for satellites data streams; and,

$2.0 million will be used to commence establishment of the integrated Global Disaster Information Network (GDIN) to improve all phases of disaster management. This will be a public/private partnership to develop an information system for those who manage and those who are affected by disasters.

The FY 2000 budget also includes funding for other projects that will enhance observation and prediction capabilities, such as:

$6.4 million to continue the replacement and modernization of the obsolete upper air radiosonde network that provides critical upper air observations

which are the principal data source for all weather forecasts. Modern radiosondes and ground receiving equipment will permit more efficient use of radio frequency spectrum and ensure reliable and consistent upper air data acquisition.

$2.2 million to initiate the national implementation of the Advanced Hydrologic Prediction System (AHPS), an integrated real-time modeling and data management/analysis system for flood forecasts, in the upper Mississippi, including the Red River of the North, and Ohio River Basin. AHPS will expand and improve forecasts of river levels from days to several months in advance of the event.

$4.3 million will be used for the GEOSTORM satellite, the follow-on to the Advanced Composition Explorer (ACE) satellite. This multi-agency program leverages the interests and requirements of NOAA, NASA, and the Air Force to increase the lead time of warnings currently provided to power companies and other industries vulnerable to solar storms. These industries have told us to make GEOSTORM our number one priority as they now depend on solar wind warning products to trigger preventative measures that help avert wide spread power blackouts and satellite failures. The satellite will be operated by NASA.

$0.4 million will be used to provide for a second flight crew for NOAA's G-IV high altitude jet to meet the operational requirement of 24-hour storm surveillance. This funding will allow the jet to be flown on high priority back-to-back missions (12-hour intervals) during land-falling hurricanes. It will also permit storm tracking for long duration hurricanes when crew rest limitations may ground the aircraft.

Finally, an increase of $1.0 million is requested to expand work with coastal states and communities to develop coastal risk atlases and provide new remote sensing data in a more timely and effective manner. This will enable coastal communities to better prepare for and recover from natural disasters.

Climate in the 21st Century

Over the past two years, climate variability has emerged as one of the most urgent, long-term strategic environmental security issues facing the United States. The demand for scientifically sound climate information by decision-makers and the public is accelerating. For this reason, as the Department prepares to enter the 21st Century, NOAA requests $19.1 million to meet the Nation's climate service needs.

Underlying NOAA's ability to improve climate and weather models is maintaining state-of-the-art computer capabilities for world-class research. Included in this request is $5.7 million to commence the acquisition of a massively parallel processing computer to improve models of climate variability and make better hurricane predictions.

The computer will be housed at the Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey. The GFDL climate model is one of the leading models used by climate researchers to project possible effects of greenhouse gases on future climate. This research provides an example of the use of high

performance computing to provide important new information regarding the potential impact of global climate change upon future weather systems.

Four key components of this initiative will provide critical funding for NOAA's unique responsibility to obtain long-term observations of the ocean and atmosphere and maintain national data archives. They are:

$1.2 million to restore and maintain operations at its baseline atmospheric observatories in Alaska, Hawaii, American Samoa, and Antarctica,

$3.0 million to begin the modernization of the Cooperative Reference Network and Raingauge Network ($1.5 million in NWS and $1.5 million in NESDIS). At present, NOAA uses paper punch tapes which are processed on a machine for which, there are no spare parts. It is one of two such machines in the world; and,

$0.9 million for the Data Centers to meet the increased demand for near real-time products, data, and information related to unusual and extreme weather, climate, and environmental events.

$1.6 million to make long-term measurement of carbon dioxide in the ocean, develop new ocean data assimilation methods, and improve existing climate models.

Finally, NOAA is requesting $6.7 million for FY 2000 to launch new climate research projects. These will provide critical data to deepen our scientific understanding of, and thus our ability to predict climate variability and change. The successful forecast of the 1997-1998 El Nino and the subsequent La Nina events demonstrated dramatically that this kind of research can realize tangible benefits. A well-documented predictive understanding of the El Nino Southern

Oscillation (ENSO) and other aspects of how our climate works is needed to determine the effects of climate anomalies on our daily lives, and is also needed to guide potential decisions regarding the role human influences play in climate change.

NOAA's Air Resources Laboratory's Atmospheric Turbulence and Diffusion Division in Oak Ridge, Tennessee, has initiated a measurement and prediction program with the specific goal of developing an air-quality forecasting system for East Tennessee, given the potential for significant impacts on the East Tennessee Valley from elevated ozone levels. As currently proposed, the East Tennessee Ozone Study (ETOS) will span two years - 1999/2000. ETOS '99 will serve as a scoping and feasibility study during which new measurement techniques, and expanded micro-meteorological monitoring network, and various vertical atmospheric/chemical sounding systems will be tested. In addition, the various computer prediction tools will be integrated and evaluated for the East Tennessee Valley.

The second phase, ETOS 2000, is intended to provide a demonstration and evaluation/validation database for the various air quality forecast model components. The full scope of ETOS 2000 is currently under planning and review, and will be refined using experience gained during ETOS 99.

Beyond the waters of the tropical Pacific - where the ENSO signal is measured - are similar climate cycles that are as important to weather and climate patterns

over North America as ENSO. NOAA plans to investigate and forecast these other key climate signals - the North Atlantic (or Arctic) Oscillation to learn the its effects on hurricane tracks and strengths in the Atlantic; and the Pacific Decadal Oscillation and its impact on the Northwest salmon fishery. Learning more about these cycles will enable NOAA to improve both climate and weather forecasts and predict their impacts at regional levels. In turn, these predictions can be used by the affected populations to guide a range of decisions from emergency disaster management to agriculture and fisheries.

NOAA also plans to investigate the recently-identified "North American carbon sink", describing on a regional scale the characteristics that lead to the net uptake of atmospheric carbon by the land. This will be done by sampling the atmosphere from aircraft flying at low altitudes, measuring carbon dioxide levels to see how they vary according to vegetation type and other terrestrial characteristics. NOAA will conduct similar experiments on tropospheric (low-altitude) ozone, measuring variations in its concentration to determine the importance of this gas in regional warming scenarios relative to carbon dioxide. One of those experiments, known as the “Best Available Technology” airborne turbulence probe, has proved to be a major success.

The “BAT” probe was developed by OAR’s Air Resources Laboratory team at Oak Ridge, Tennessee. These probes were initially developed to help derive data on air-surface exchange rates of meteorological variables and of CO2 and other trace gases, but their use is now far wider. They are already fitted to

several research aircraft designed for high-altitude studies, e.g., of clear-air turbulence in the upper troposhere and lower stratosphere. The first of what is likely to become a US fleet of aircraft specifically designed to carry the probes, is already being tested by scientists of San Diego State University. The science of coupling the atmosphere with the surface underneath is taking a step forward with the commercial availability of this new research platform.

CONCLUSION/WRAP-UP

In conclusion, Mr. Chairman, the FY 2000 Request builds on the progress we have made with your assistance and support over the past years. NOAA's environmental stewardship and assessment missions are essential to securing our Nation's success in the 21st Century.

In meeting our mission, NOAA continues to focus the efforts of Government on what matters to the American people. Success in this changing world increasingly depends on partnerships with business and industry, universities, state and local governments, and international parties. NOAA continues to develop these partnerships to leverage resources and talent, and provide the means for meeting program requirements more effectively.

The FY 2000 budget is an investment for the 21st Century, a step toward a more viable, economically sound, and ecologically sustainable future... where environmental stewardship, assessment, and prediction serve as keystones to enhancing economic prosperity and quality of life, better protecting lives and property, and strengthening U.S. trade.

Thank you again for the opportunity to appear. I would be pleased to respond to any questions members of the Subcommittee may have.